



POWER TOWER MARKETS

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POWER TOWER MARKET POTENTIAL IS:

- **WORLD WIDE** - World is Buying Our Technology
- **REAL & IMMEDIATE**
 - Solar Tres, Spain
 - World Bank (Global Environmental Fund) India
- **PROSPECTS**
 - World Bank / GEF Egypt, Morocco & Mexico
 - South Africa
 - China
 - Spain 50 MWe Follow-ons (Solar Quatro & Cinco)
 - Italy



GLOBAL MARKET POTENTIAL



★ Near, Intermediate & Long Term Prospects



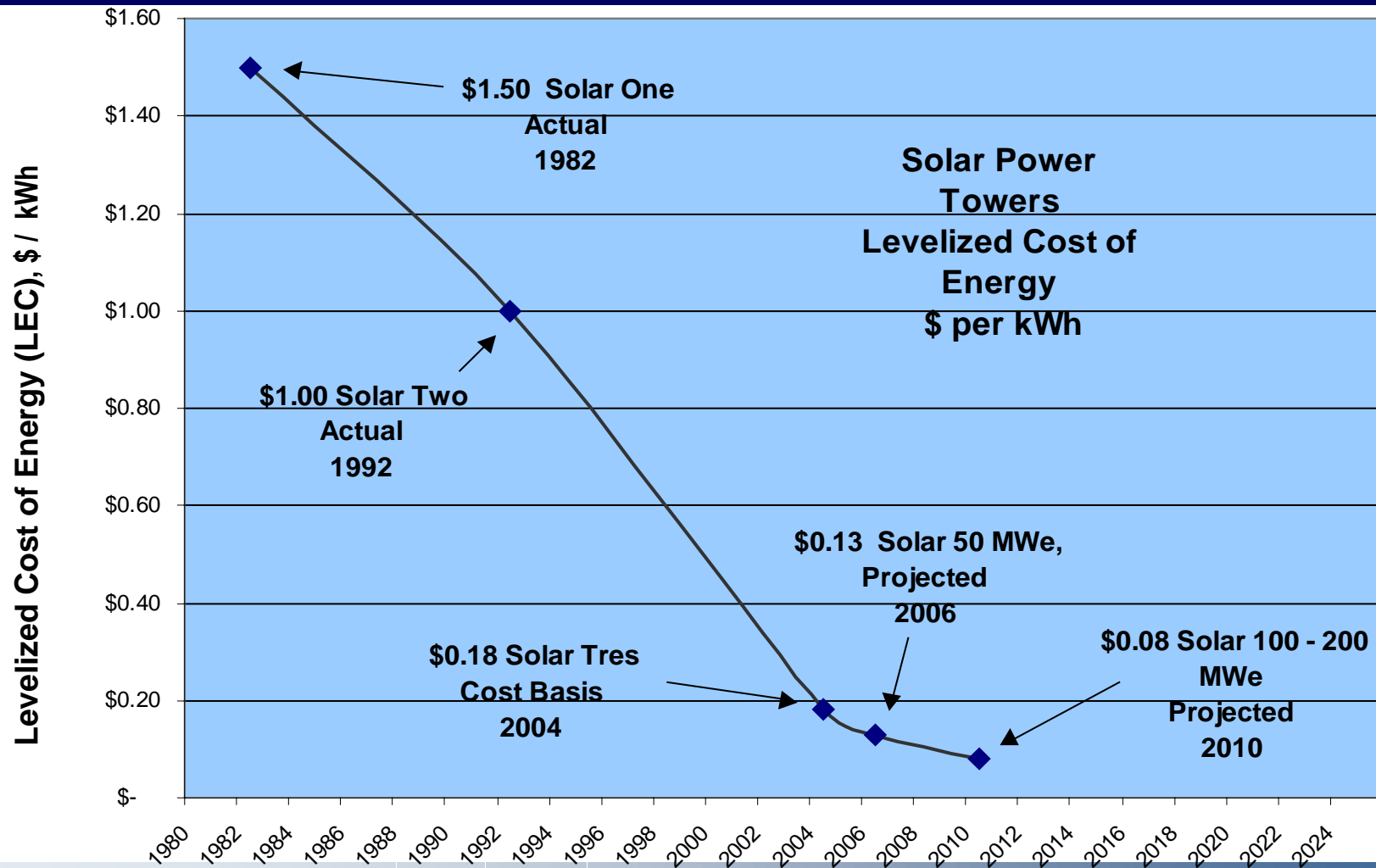
SNL SUPPORT TO INDUSTRY

- DOE has Managed an Extremely EFFECTIVE PROGRAM
 - Solar One (SI) Demonstrated the Concept
 - Solar Two (SII) Proved Feasibility
 - Solar Tres (SIII) Evolves the Technology with Innovation & Advanced Component Development
- Sandia National Lab is RESPONSIVE to Industry Needs
 - Providing Quality Technology
 - Joint SNL/Industry Agreement on Research Task Priorities

RESULTED IN MAJOR COST & RISK REDUCTIONS

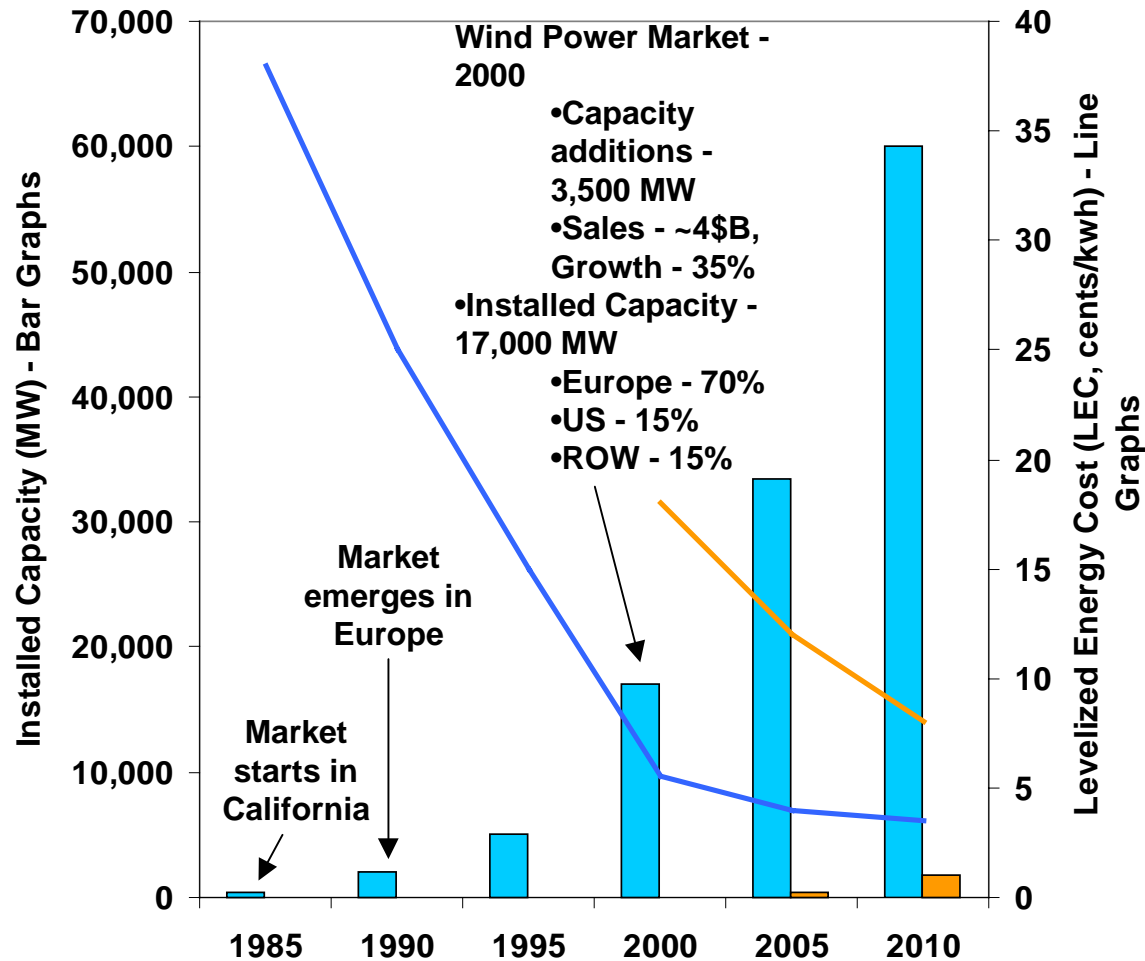


CSP TECHNOLOGY CHEAPER NOW THAN PV WILL BE IN 10 Years





TOWER MARKET GROWTH POTENTIAL COMPARED TO WIND



Source: AMERICAN WIND
ENERGY ASSOCIATION, DOE
& BOEING



SPAIN (SOLAR TRES) NEAR TERM

- SIII is a REAL PROJECT - Commercial IPP
- BECAUSE OF PAST DOE SUPPORT
 - US INDUSTRY is CONFIDENT
 - US & EUROPEAN INDUSTRY are PROCEEDING AT THEIR OWN RISK
 - EUROPE is INVESTING
 - EXPORT of US HIGH VALUE SERVICES & HARDWARE is OCCURING



WORLD BANK / GEF- NEAR TERM

- 4 ISCCS PROJECTS (\$50M set aside for Solar Portion of each)
- INDIA, MOROCCO, EGYPT & MEXICO
- BID PACKAGES IN PREPARATION
- INDIA Applying **Power Tower THERMAL STORAGE TECHNOLOGY** to justify economics
 - DOE input saved the INDIAN project



SPANISH FOLLOW ON PROJECTS

- *SOLAR QUATRO and SOLAR CINCO*
- *Commercial Follow-on TOWER projects*
- *Plant Sizes LIMITED by Royal Decree to 50 MWe*
 - *TOWER however capable of much greater capacities*
 - *Plans are 50 MWe capable of 24 Hours / Day Operation with 16 Hours of Thermal Storage*
 - *50 MWe x 24 Hours/Day is equivalent 140 MWe of day time only PV*
- *Supported by Power Purchase Premium*



SOUTH AFRICA - NEAR TERM

- INVESTING IN A CSP TECHNOLOGY PROGRAM
- EVALUATING both POWER TOWERS, TROUGHS, DISHES
 - NEXANT is Negotiating a Collaborative Agreement for a Feasibility Study
- MANUFACTURING CAPABILITIES
 - Must Maximize Local Development & Manufacturing
 - High Technology Services & Hardware Export from US Industry
 - Conventional Services & Hardware from South Africa
- **DOE supported this activity**



ITALY - NEAR TERM

- REAL
- GOVERNMENT has COMMITTED :
 - 120 M EU (\$109 M) to Demonstrate CSP Technology in Southern Italy
- Must DEMONSTRATE Dispatchability and Thermal Storage



CHINA - INTERMEDIATE TERM

- BUSINESS AGENT Currently Negotiating 100 MWe POWER TOWER FEASIBILITY Study
- REAL Interest by High Level Central & Provincial Government Authorities



Europe Investing In US CSP Technology

- EU is HIGHLY concerned:
 - That the US DOE is Out of Step with Rest of the World with respect to CSP
 - About the stability of Mid Eastern Oil supply and is doing something about it
 - About Continued Environmental Damage and Green House Gases and is doing something about it



EU and SPANISH GOVERNMENT SUPPORT

- GRANT STATUS
 - BRUSSELS \$4.6 M TECHNOLOGY GRANT AWARDED
 - BRUSSELS ADDITIONAL \$4.6 M GRANT PENDING
 - SPANISH TO DESIGNATE SIII AS STRATEGIC PROJECT
 - Interest Free Loans \$ 25 M
 - Technology Grant - Receiver Manufacturing \$ 8 M
 - POWER PURCHASE PREMIUM Pending
 - \$ 0.137- 0.165 / kWh (25 - 30 Pst/kWh) plus Market \$ 0.044/kWh (8 Pst / kWh)
 - **A \$ 0.165 / kWh Premium is Equivalent to \$ 154 M Discounted over 30 yrs**
 - FREE PROVINCIAL LAND for Manufacturing Facilities

EUROPE IS INVESTING HEAVILY IN SOLAR TRES



DOMESTIC

- There is US Congressional Support:

“Additionally, the conferees direct the Department to develop and scope out an initiative to fulfill the goal of having 1,000 MW of new parabolic trough, **power tower**, and dish engine solar capacity supplying the southwestern United States by the year 2006.”
- SOUTHWEST INITIATIVE
 - Peaking Power Capability
 - 11 mi² of Nevada Desert will produce as much power as the Hoover Dam (~2000 MW)
 - TOWER Fully DISPATCHABLE



DOMESTIC (Continued)

- GIVEN 100 MWe TOWER
 - MOST Economical Solution to meet Portfolio Standard (SOLAR)
 - \$0.08 Kw/H Power Competes in the PEAKER Market Today
 - No Fuel Cost Volatility Risk
 - CHEAPER Than Other Renewable Alternatives
- Plan is to enter US Market after successful Initial Operations of Solar Tres and completion of SNL Scale-up Component Testing
- Time Frame 2006 -2010